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SWINE PARASITES

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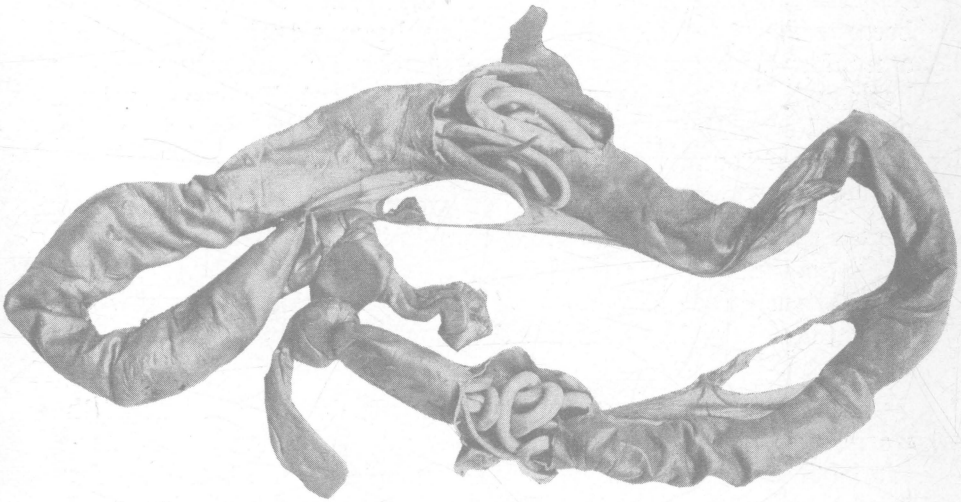
There is probably no subject of greater interest to hog raisers than parasites. Many good hog men who are familiar with condi-



Showing section of small intestines almost filled with round worms

tions have been heard to remark that the actual loss of pork due to the existence of parasites, particularly of the internal type, is greater than the loss from hog cholera. It is not the purpose of this bulletin to enter into a lengthy discussion of all parasites which infest swine, but merely to give the symptoms, life-history, and methods of control or eradication of a few of the most prevalent of the pests. The parasites which commonly infest hogs may be divided into internal and external.

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The Round Worm

The most common of the internal type of hog parasite, and the one which causes the most damage, is the common round worm. It infests the intestines primarily, but may be found in the other organs of the body. If these worms become numerous, they will cause serious digestive and other disorders. Recent scientific investigations have proven that they may cause a great deal of damage other than as a mere internal parasite because they will so lessen the general vitality and resistance that the hogs are more susceptible to other diseases. Young pigs are most susceptible to these parasites. As the pigs grow older they become more resistant, but if the infestation is very bad when they are small, they will become unthrifty and may eventually die. In any case, considerable damage will be done.

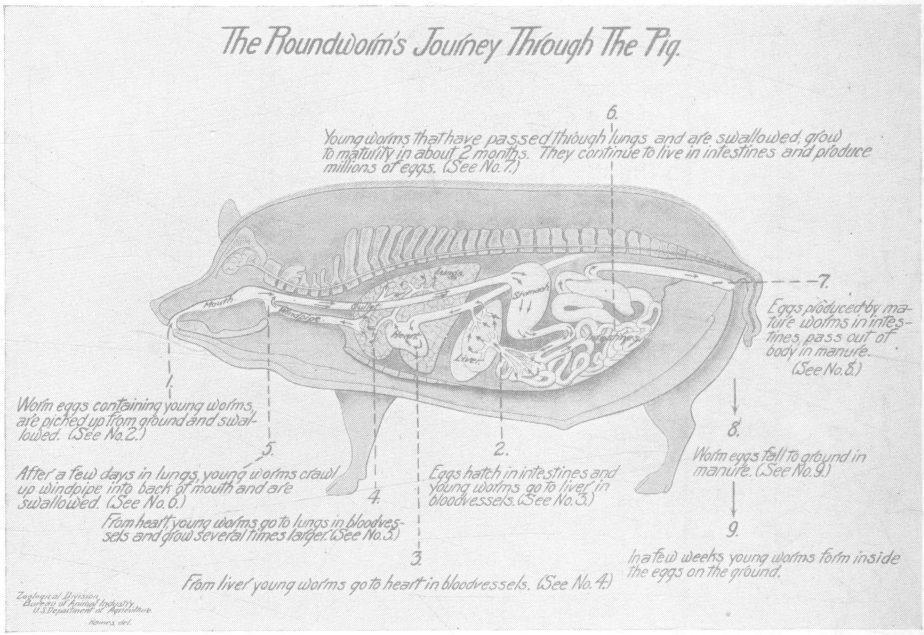
The prevalence of these parasites is not always recognized because the pigs may not immediately become unthrifty. In fact, a number of cases have been noted where apparently perfectly healthy, thrifty pigs have died suddenly without showing symptoms of any disease, but upon post-mortem showed extremely severe infestation of round worms.

Sources of Infestation.—The worm eggs containing young worms are picked up from the ground in infested places by the pigs while rooting around; another, and perhaps a greater, source of infestation is from the eggs adhering to the skin of the sow and being taken into the mouths of the suckling pigs while nursing, and swallowed.

The Journey Thru the Pig.—In the early development of the worms, when too small to be seen without the aid of a microscope, they find their way into the blood-stream, flow into the liver, then from the liver to the heart, and from the heart to the lungs. In the lungs they develop several times larger and usually collect in patches at the lower part of the lungs. After a few days in the lungs, the young worms crawl up the windpipe, and the irritation thus caused is the reason for considerable of the coughing often noted in young pigs. Some of the worms are coughed out, but probably most of them are swallowed. The time required for the journey as described is usually about 10 days, and after settling down in the intestines the worms will grow to maturity in about 2 months. When full grown they are about a foot long. They continue to live in the intestines and adjacent tubes, such as the bile duct, and produce millions of eggs. It is estimated

that one mature female worm may lay as high as eighty million eggs. The eggs pass from the hog in the manure and drop to the ground. In a few weeks, the tiny worms form inside and are ready to go thru the above process.

Methods of Treatment.—When pigs have become infested with these worms, it is advisable to treat for them. The preferable time for treatment is when the pigs weigh from 40 to 60 pounds, or within two or three weeks after weaning. The most effective and efficient treatment is by the capsule method. This consists of keeping the pigs off feed for 24 hours and then giving a capsule containing



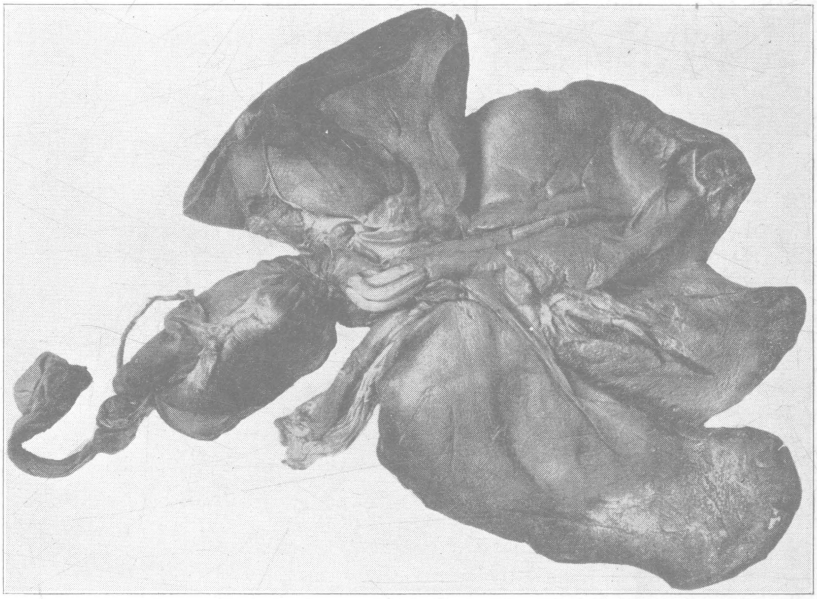
the following, which is a sufficient dose for pigs of the weight suggested:

Santonin	2 grains
Aloin	3 grains
Sodium bicarbonate	8 grains

These capsules are best administered by the use of a capsule- or balling-gun and a speculum or jaw spreader. In giving the capsule, place it over the ridge of the tongue into the back part of the mouth but do not attempt to force it down the throat, as that might prove injurious to the pig. Keep the pigs off feed an additional 18 hours following treatment. If the weather is warm, water will have to be supplied during the fasting period, but withhold for several hours before and after treatment. Use care in

getting the pigs back on feed. Feed lightly at first; a slop or laxative feed is best. If clean pasture is available the treated hogs should be turned in it.

If the pigs treated have been infested, results should be noted within 24 to 48 hours, but there are several reasons why the worms may not be noticed in large numbers. They usually are dead when passed and may have started to disintegrate while still in the intestines; the hungry pigs may eat them as fast as they are passed; chickens, also, will pick them up. Worms eaten by the pigs will do them no harm.



Showing how the round worms work into the bile ducts of the liver

When hogs weighing much over 60 pounds are to be treated, two or more capsules should be given in proportion to the weight of the hogs. However, it is hardly advisable to treat hogs much over 100 pounds by this method, as hogs over that weight are hard to handle while giving the capsule; then, too, the need for treating pigs of that weight is so much less, because their natural resistance is sufficient to prevent serious infestation.

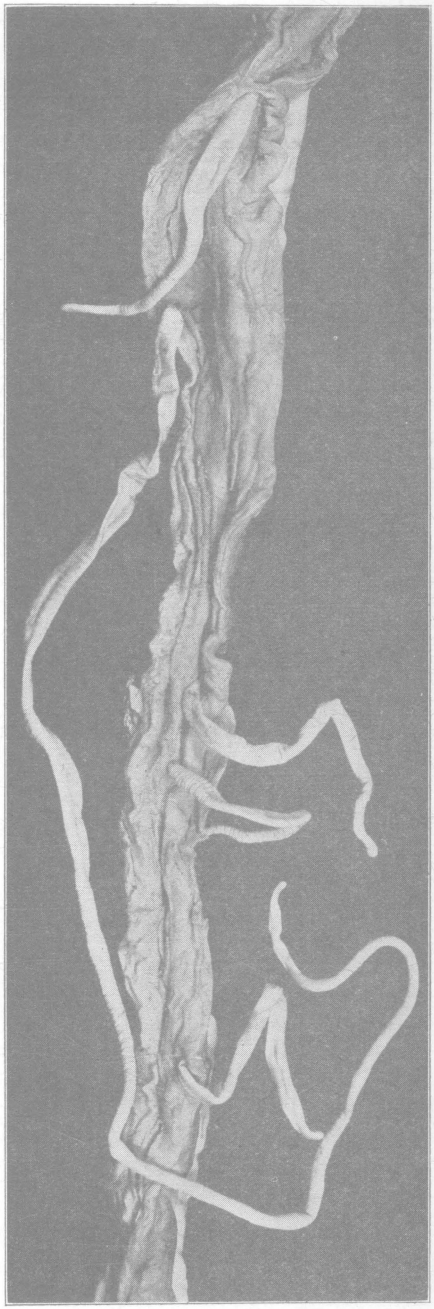
Oil of chenopodium is sometimes being recommended as a treatment for intestinal worms but its action is so inconstant and uncertain that its use is not to be generally recommended unless santonin is unobtainable or prohibitive in price. If oil of chenopodium is used, it is preferable to get the commercial capsules containing the oil and administer in the same way as the santonin capsules. Doses

of oil of chenopodium should always be followed by a purgative.

Where it is entirely impracticable to use the capsule method of treatment because of the size or large numbers of hogs to be treated, probably the best treatment is to use 1½ to 2 grains of areca-nut to each pound liveweight of hog mixed with a small amount of feed. As with other methods of treatment, the hogs should be kept off feed some time before and after giving the areca-nut.

Preventive Measures.—While it has been stated that practically all hogs are more or less badly infested with round worms sometime during their lives, yet by using a little more than ordinary care in the management of the brood sows and pigs, it is possible in a large measure to prevent infestation, and eventually eradicate the worms. Such a system of management, of course, is far better than to resort to treatment because, as always, "an ounce of prevention is worth a pound of cure." The best plan for prevention is as follows:

1. Clean all farrowing pens with boiling water and lye. The boiling water is destructive to the worm eggs and the lye helps to remove the dirt. If individual farrowing houses are used, they should be moved to lots not recently used as hog-lots and treated as suggested for pens.



Section of small intestines showing thorn-headed worms attached to intestinal wall

2. Wash dirt from the skin of the sows before farrowing time and put them in the clean houses or pens.
3. Within a few weeks after farrowing, move the sows and litters to clean lots or pasture, being careful that the hogs do not become contaminated by passing thru infested places.
4. Keep the young pigs in the clean lots or pastures for at least 4 months; after that time they will usually have sufficient natural vitality to keep them from becoming badly infested. Hog pastures should not be used more than 2 years in succession. They should be plowed and put in a system of crop rotation. The eggs of the round worm have a wonderful vitality and may remain alive for as long as five years.
5. Provide proper feed, water, and shelter; an undernourished pig is always more susceptible to parasites than one properly fed.

If this system of management is carefully and consistently practiced, the infestation of intestinal worms will soon be reduced to a minimum and eventually eradicated.

Other Intestinal Parasites

The thorn-headed worm is whitish in color and somewhat larger than the round worm. Its head end has a hook which is covered with many smaller hooks. It is with these hooks that the worms attach themselves to the inside walls of the intestines.

The pin worm is a small, brownish-white worm about ½ inch long and is usually found in the beginning of the large intestine.

The whip worm is about ½ inch long, small at the head end and quite thick at the other end.

It is seldom that any of these worms cause any serious disorders except that their presence may aggravate the conditions caused by other parasites. The source of infestation is very much the same as with the round worm and the same treatment will usually be effective. However, with these worms, as with the round worms, sanitation and frequent plowing of hog-lots will do more toward control and elimination than any treatment which may be prescribed.

Hog Lice

The most prevalent of the external type is the common hog-louse. When a hog is badly infested with lice, hundreds of eggs will be found on the hair back of the ears, along the front of the shoulders, and on the flanks. The time required for the eggs to hatch will vary with the temperature and weather conditions, but they will usually hatch in a period of from 10 to 15 days. The louse itself is a blood-sucking parasite about ¼ inch long.

Apparently, because hog lice are so common and their distribution so general, the serious effects where they exist in large numbers is not generally recognized. Often when hogs become unthrifty, they are said to be "off feed" or "out of condition" and the stock-tonic salesman finds a ready buyer. On close examination, the trouble may be directly traced to the existence of large numbers of lice on the hogs. If the lice are permitted to increase unmolested, they may become so numerous that the skin of the hogs will become covered with scales or sores and in extreme cases inflammation and swelling develops. Such a condition will cause the hogs considerable irritation, and result in the serious impairment of growth and fattening ability, particularly of young pigs. Not only will the lice cause direct injury in this way, but they also lessen the vitality of the pigs, and lower their resistance to other diseases.

Treatment.—Since the killing of these parasites is a comparatively easy matter, there is but little excuse for a herd becoming badly infested. Perhaps the most economical and, at the same time, effective treatment is the use of crude oil or petroleum. Use of oil drained from the crank-case of an automobile or tractor will also generally prove effective. The common coal-tar dips, if used strictly according to directions, or a little stronger, will usually do the work for which they are intended. These materials may be applied with a spray-pump, sprinkling-can, or the use of a dipping tank. The method used is not so important as making sure that the job is *thoroly* done. If a dipping tank is used with oil, only enough of the oil to keep the surface of the water well covered, is necessary. At the same time, the hog quarters should be cleaned and disinfected. The use of a coal-tar creosote dip, diluted according to directions, is suitable for the purpose.

Such treatment as above prescribed will have no effect on the lice eggs, so it will be necessary to apply the treatment several times at about two-week intervals. If this system is practiced consistently and the hog quarters are kept in reasonably good sanitary condition, the lice should eventually be eradicated.

Mange

Mange in swine is not nearly so prevalent as lice, and is harder to get rid of when it does occur. The cause of mange is small external parasites commonly called the mange-mite. There are two distinct species of these mites. One burrows into the skin and the other one into the hair follicles. Both species are so small that they cannot be detected readily on the skin of the hog without the aid of a microscope but the symptoms described are sufficient evi-

dence of their existence. The parasites are spread by direct contact or by infected bedding, etc.

Symptoms.—At first mange usually attacks the weanling pigs, but will soon spread to the older hogs. The first symptoms are an inflamed and irritated condition about the eyes and ears; this gradually spreads to the neck, flanks, and inner surface of the thighs. The skin becomes wrinkled, the hair stands erect and soon either falls out or becomes matted with the scabs or crusts that form at the roots of the hair. The scales may eventually extend the full length of the body. The symptoms are usually more pronounced in the winter season probably because circulation in the pig's skin is slower and conditions more favorable for development of mites.

Treatment for Mange.—The treatment is much more difficult than for lice. In addition to external applications of something to kill the mites, it will be necessary to have a general clean-up of quarters and also to give the pigs plenty of nourishing food, as a poorly nourished pig is more susceptible to the disease.

Where the number of infected pigs is small, it is advisable to wash them thoroly with soap and water before applying the remedy. Dipping is the only practical method where large numbers are to be treated, and thoroness is one of the first essentials of successful treatment. It is necessary to keep the hogs in the dip until the scabs are thoroly soaked thru; one dipping, if properly done, should kill the mites. However, this dipping will not kill the eggs, so a second immersion should follow six days after the first. Usually an improved condition of the hogs will be noticed within a day or two following the first treatment, but perseverance will be necessary to effect a complete cure.

How to Prepare the Dip.—The best remedy is lime-sulfur dip made as follows: 10 pounds fresh lime, 24 pounds flowers of sulfur, water to make 100 gallons. Slake the lime, then add enough water to make a thin paste and stir in the sulfur. Boil the mixture with 25 to 30 gallons of water for two hours. Pour into a barrel or other vessel and allow the sediment to settle, as only the clear orange-colored liquid is used. Draw off the liquid and add enough warm water to make 100 gallons. Use while warm (100°-110° Fahrenheit) and use care in getting the measurements of the ingredients exact. After treatment the pigs should be placed in clean, disinfected quarters.

Other remedies which may be used are some of the common "coal-tar dips" but usually they are not quite so effective as the lime-sulfur dip, especially in severe cases. A heavy grade of crude oil used as a dip has also given good results in some instances. This should be used in the same manner as described in dipping for lice.